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FOSSIL HUNTING IN TEXAS

By EDWARD L. TROXELL, PH.D.
ANN ARBOR, MICH.

THE romantic side of a collector's experience is often eclipsed by the hardships he has to endure, yet the pleasure resulting from marvelous finds of rare and valuable specimens is only increased by the difficulties attending their discovery.

The *Equus scotti* quarry at Rock Creek,[1] Texas, found by Mr. J. W. Gidley, has furnished many very interesting stories, some valuable scientific data and ten skeletons of a rare prehistoric horse. This species, though having but one toe on each foot is, nevertheless, a direct descendant of the three-toed animal which roamed the western hills millions of years before. It is the last representative of a race whose extinction, in the Western Hemisphere, followed closely the advent of man in the Old World—a period commonly considered at least two hundred thousand years ago. Within historic times the horse, again introduced by the Spaniards, had adapted himself most readily to his original American home.

Mr. Gidley told me recently of the discovery of the hill with its unusual deposit of fossil bones. It was a story of fruitless effort and keen disappointment, ending abruptly in the joys of success. He had searched many times about the arroyo where rapid erosion had exposed the strata. Finally the attempt was given up, but on the way out the party camped at the spring near the head of the creek. Unable to resist the temptation, moved by an overwhelming impulse to hunt once more, Mr. Gidley went out and almost immediately found the portion of bone exposed which lead into this very rare deposit.

Thirteen years later, the Yale Expedition of 1912, under the leadership of Professor R. S. Lull, went to the same quarry to secure if possible another specimen of the extinct horse. Two unsuccessful attempts were followed by the lucky third in which, on the second stroke of his pick, Professor Lull unearthed a bone and shortly discovered the skeleton now mounted in the Yale Museum.

It was with the knowledge of these former successes that I went again in 1914 to the head of Rock Creek in the hope of finding additional material of *Equus scotti.* The first digging in 1899 began at the edge of the sloping hill, but each successive excavation left the bone layer deeper and deeper. The specimen found in 1912 lay buried twelve feet, while those found last year were about fourteen feet beneath the surface. It was necessary, therefore, to use a plow and scraper to facilitate the removal of the thick covering of sand and soil. This could be done only to a depth of ten or eleven feet without endangering the fragile skeletons with the heavy tools. The remaining three feet we moved with our shovels, spading most carefully lest a valuable skull or limb, suddenly appearing, might be seriously damaged.

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[1] See Osborn's "The Age of Mammals."

The first four days were spent stripping the upper layers from a portion of the quarry. On the fifth the spading began, and in just four hours we were rewarded. Four days of preparation and four hours of actual search disclosed the skull of the first specimen; thus, early,

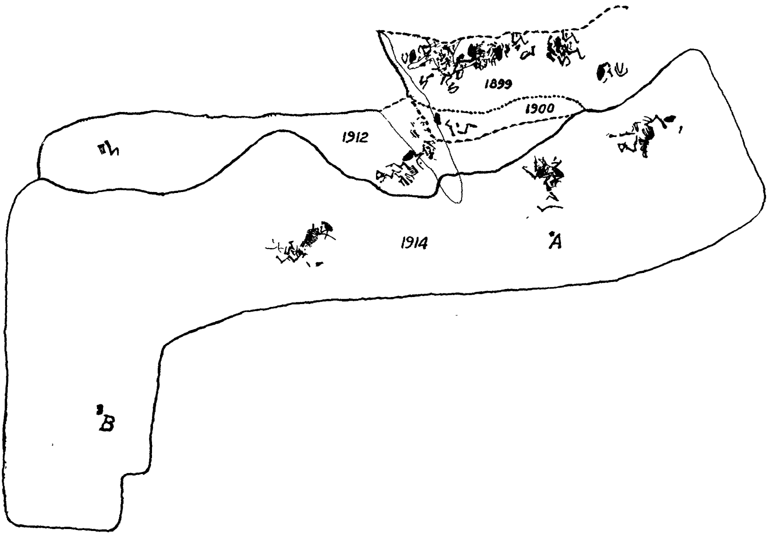

FIG. 1: Gidley's Quarry, showing the successive excavations and the distribution of the various specimens. Over a thousand cubic yards of sand and soil were removed in 1914. *A*. The sixth cervical of a very large camel *Auchenia hesterna*, found just before the discovery of the second horse near by. *B*. A fragment of the pelvis of the ground sloth *Mylodon harlani*. These two odd bones show definitely that the deposit belongs to the Earliest Pleistocene.

assuring us of the success of the enterprise. This skeleton, which is now mounted in the Museum of Amherst College, proved to be complete, except for the neck vertebræ, the sacrum and some minor portions, The fossil was treated with the utmost care, for the bones were so very fragile they would have fallen to pieces if picked up prematurely. The matrix of sand was removed with an awl and small brush and before the bones were handled they were hardened with a solution of gum arabic or shellac. Sometimes the larger parts, and those more delicate, were wrapt with strips of cloth dipped in flour paste before they were turned over. In every case they were so treated before shipping and some were even bandaged with plaster before packing in boxes of straw or hay. About a week was consumed in taking up the parts. In the meantime the search, which was continued through the adjoining area of fifty square yards to the south, revealed not a single bone except those immediately about the skeleton already described.

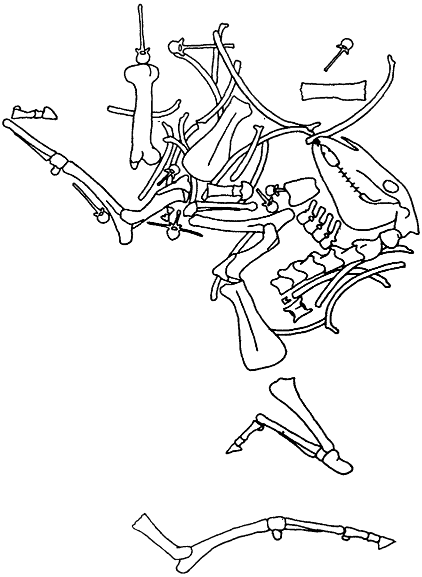

FIG. 2. The second specimen of the horse *Equus scotti.* Note the dismantled and jack-strawed character of this young skeleton.

Just two weeks after the first discovery, the scraper uncovered the neck bone of an animal much larger than a horse. It proved to be the cervical of a very large camel. Its very unusual position, about three feet above the main bone layer, accounts for the ruthless treatment,

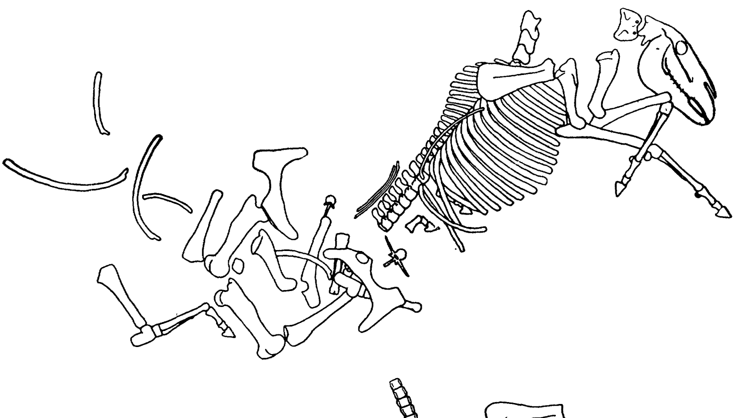

FIG. 3. The third specimen of *Equus scctti,* the last and most perfect of those taken out of the quarry; a mature individual. Now at the Victoria Memorial Museum, Ottawa, Canada.

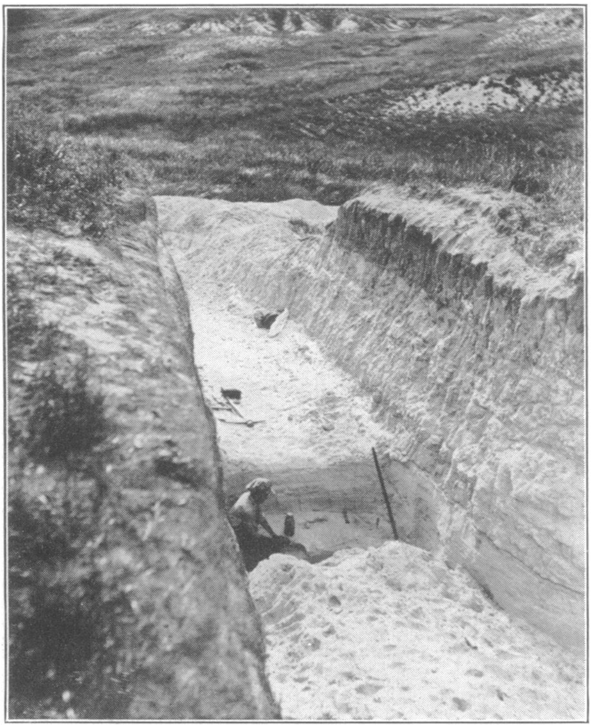

FIG. 4. A view of the trench from the bottom of which came the third specimen. The left bank had to be removed entirely.

its discovery with the scraper. This strange bone made such an impression on my mind that, together with the physical exhaustion from the work and a hard bed of straw, my sleep was very much disturbed. I could think of nothing but bones, of horse skeletons broken up and all dismembered. The dream seemed so real that I related it the next morning to the men, indicating the spot where the bones seemed to lie. I offered them each two days' extra pay if they found the skeleton, and proceeded to my work on an elephant's skull a mile away. About nine-thirty one of the men came over and said: "We've sure enough found it." I was not in the least surprised: although it was lying within three feet of, and probably on the identical spot I had earlier pointed out, and strangely enough the bones, while individually in excellent preservation, were all disarticulated, a character peculiar to an immature individual. The skeleton proved to be that of a young stallion, as indicated by the large canine teeth, the so-called "tusks."

I have seldom seen fossil bone in a more excellent state of preservation. It was a smooth pale yellow turning white on exposure to the air as the evaporating moisture deposited its mineral content on the surface. The bones had been well protected from the agents of weathering beneath the thick blanket of sand; while, roots, usually so destructive to fossils, had only slightly etched the surface of a few parts. This skeleton was complete except for a part of the back bone, the pelvis, a few ribs and one hind limb.

Shortly after finding the second horse the scraper disclosed another unusual bone, which, like the camel cervical, was about three feet above the main deposit. This large block was a fragment of the pelvis of the ground sloth, *Mylodon.*

Continuing the hunt with our shovels, in the fifth week we were fortunate enough to find a third horse. At first only the hind quarters were visible, as the bones lay in the bottom of a narrow trench. Since the end of the back bone was protruding from beneath fourteen feet of sand, it was necessary to tear away completely the small outlying hill forming one wall of the trench in order to secure the front quarters. This third horse is undoubtedly the most perfect of all the ten specimens discovered in the quarry. It lacks only the sacrum and three parts of the neck. In marked contrast to the second specimen, a young animal, the third shows how much more firmly, in maturity, the bones are knit together and kept in their proper positions by the cartilages. The fore quarters of the last specimen were practically

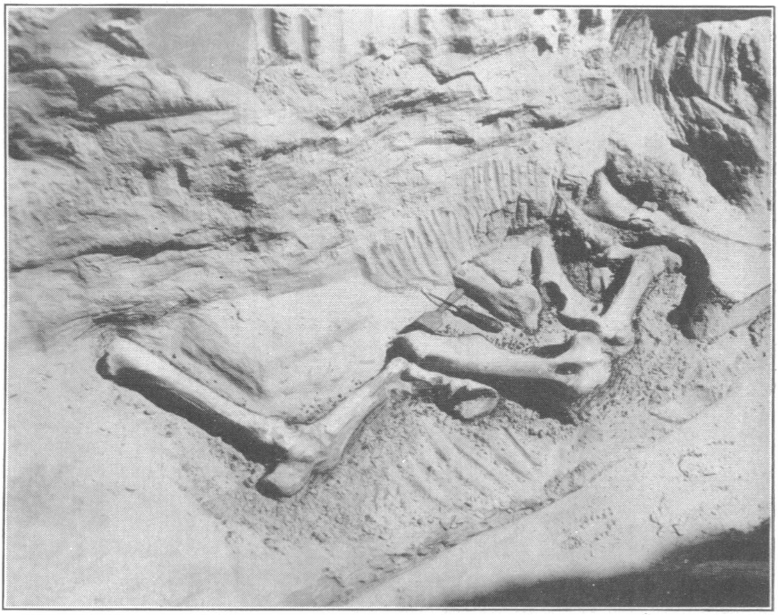

FIG. 5. The hind quarters of the third specimen, which can be identified in the drawing, Fig. 3. These bones lying in the bottom of the trench were found after having removed fourteen feet of sand and clay.

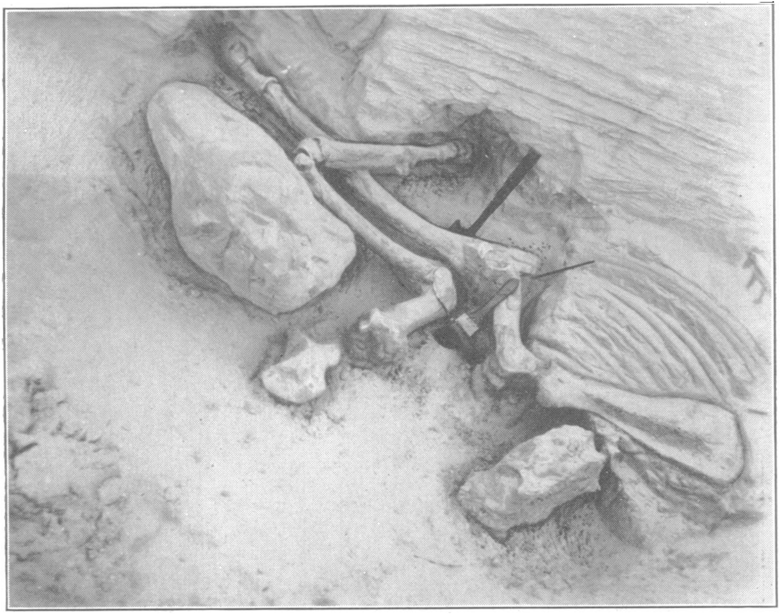

FIG. 6. The fore quarters of the third specimen, after the removal of the outlying hill. (See Fig. 8.)

intact. The position of the front limbs is most impressive as one imagines the poor victim in the sand struggling his last, then quiet.

No other complete skeletons of fossil *Equus* have ever been found outside the Gidley Quarry. The nearest approach is from the asphalt deposits of Rancho La Brea, California, "where a number of good skulls have been obtained with much material consisting of loose teeth and elements representing all parts of the skeleton" (Merriam). Only two other species are known even by single skulls.

A study of the geology of the quarry furnished some interesting problems. The question is frequently asked: "How did the horses get there?" Of course it is impossible to give a positive answer, but very probably they were mired in the sands of an ancient stream bed or caught in its waters and drowned. The close association of the skeletons makes it appear that the animals were swept together in a whirlpool. Miring in quick sand occurs so commonly to-day that it offers an explanation easily understood and readily accepted. The fine sand found in the quarry even when dry is most difficult for a horse to traverse and if wet would make a veritable trap. A peculiar fact, noted in connection with the three horses found in 1914 and the specimen of 1912 (the only ones with which I am personally familiar), is that the heads are all pointed toward the northeast. Professor Williston has described a herd of fossil peccaries all headed one way and he presumes that they were overcome while fleeing before a dust or snow storm. In the present case it is more probable that the horses were moved by the stream. The body, distended with gases, would float more readily than the head; the latter acting as an anchor would drag behind in the shallow water and on coming to rest would point in a general direction up stream. This conclusion is supported by observed ripple marks which in a north-south section showed that the current was coming from a northerly direction.

It is certain that the carcasses lay, before burial, long enough for the flesh to decay. We find the skeletons dismembered and the bones scattered; some parts are entirely lacking and frequently the members of separate individuals are associated together. The scattering of the parts may have been accomplished by carnivorous animals tearing at the flesh; a portion of one rib showed markings like those of a gnawed bone.

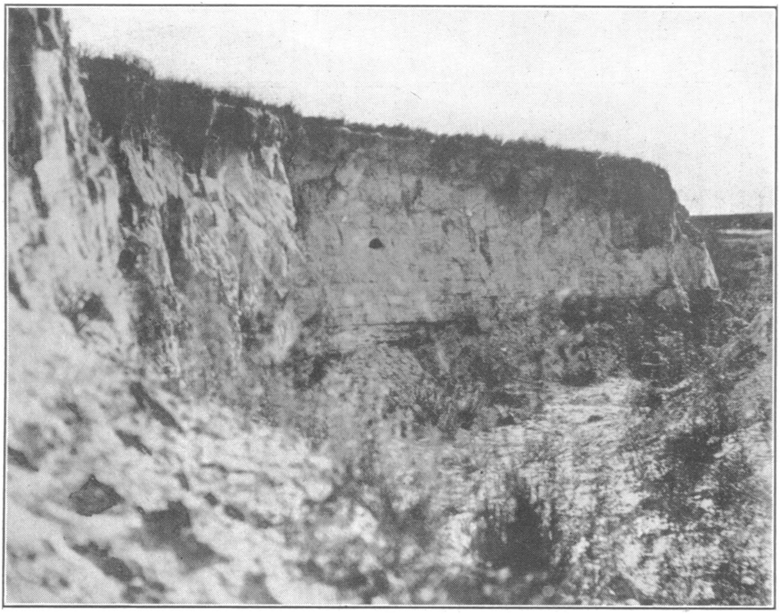

FIG. 7. The face of the twelve-foot bluff left by the Yale expedition of 1912, now entirely removed.

The more violent current which began the process of burial gave way to one more and more gentle, until when three feet of sand had been deposited the water was so calm as to allow a half inch of clay to settle down from the material in suspension. It was at this level that the camel and sloth bones came to rest. They were then buried by a gentle action of the stream depositing evenly bedded layers of sand to a depth of six feet, above this was a great quantity of clay. At one time the skeletons were probably buried to a depth of fifty feet, when the whole area was built up to the level of the High Plains.

Recent stream action has cut out the canyons and arroyos, laying bare the underlying strata. The present drainage is toward the east; when the bones were deposited it was toward the south or southwest, but at a time between the periods of these two, a third system carried its waters off toward the north. On the diagram, Fig. 1, can be seen the refilled remnant of a "V"-shaped channel crossing the quarry. Where it cut the fossil bed the bones were shifted, waterworn and redeposited at a lower level.

The geological age of the formation was assumed to be Early Pleistocene. The finding of the two unusual bones, one the sixth cervical of *Auchenia hesterna,* a large camel, the other a portion of the pelvis of the ground sloth *Mylodon harlani,* proves beyond doubt that the fossils not only belong to that period, but to the true "Equus Beds." In addition to these single bones, actually excavated, there were also found, farther up the hill, some pieces of ivory from the broken tusk of an elephant. These odd fragments are practically valueless for exhibition purposes, but from a scientific standpoint are really of very great interest since they determine the period in which the horses lived.

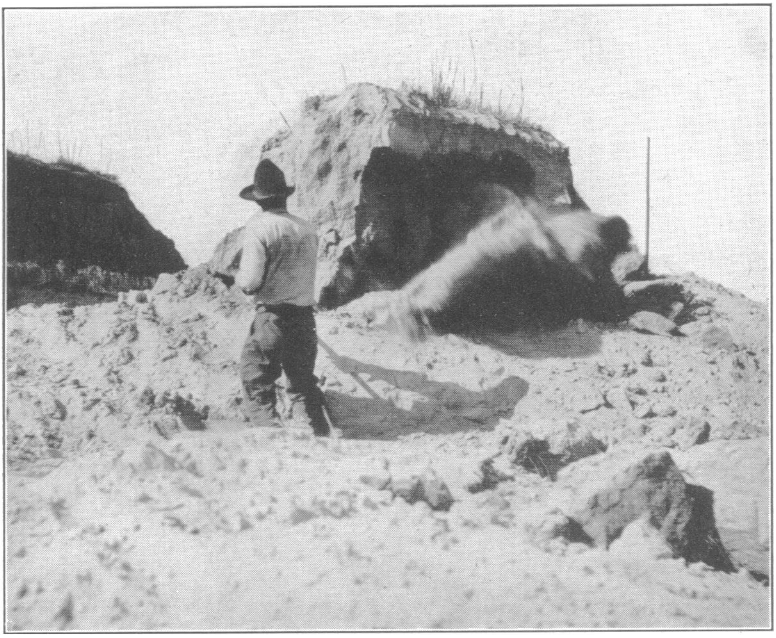

FIG. 8. The process of removal of the hill overlying the third specimen. The soft sand was dug from beneath, allowing huge blocks to fall of their own weight.

A rough estimate of the summer's work shows that over a thousand cubic yards of earth were removed, weighing approximately fifteen hundred tons. This covered an area of over three hundred square yards. The work occupied a period of about seven weeks; during that time a team was used but eleven days and the equivalent of one assistant for forty-eight.

The region about the head of Rock Creek was once the home of great hordes of prehistoric animals, which we now know only by their abundant fossil remains. In this small area as many as fifteen different species have been found represented to-day by the turtle, peccary, horse, ass, sheep (?), dog, sloth, elephant, camel and an extinct animal *Glyptodon* whose nearest living relative is the armadillo. Most of these species have been discussed in recent issues of the *American Journal of Science* and new types are furnished by a dog, an ass and a ruminant.

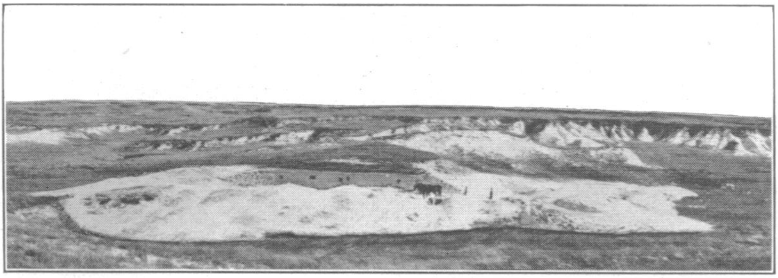

Fig. 9. A distant view of the Quarry, the wall left standing and the white material carried out in the process of excavation.